

# A Transect Approach To Mapping Tiger Beetle Colonies on the Brookhaven Firebreak

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## Abstract:

Tiger beetle (genus *Cicindela*) populations on the Brookhaven National Laboratory campus have been actively studied since their initial characterization in 2007. This project presents a transect approach to mapping the extent of tiger beetle populations on the fire breaks that run along the east and north of the campus. Visual index counts of adult members of the *Cicindela punctulata* and *Cicindela sexguttata* populations on the firebreaks were performed and the numbers of individuals observed were used to generate population density maps of the firebreaks. It was observed that population densities for both species were highest at the periphery of both firebreaks. Implications of this pattern for anthropogenic disturbances in the compaction of soil along the firebreaks are discussed.

## Introduction:

Tiger beetles represent a widespread and well studied subfamily of insects. Over 2600 species have been described, distributed globally across a wide variety of habitats [1]. Because of their distribution and the preference of particular species for specific habitats, Tiger Beetles are widely used as indicator species in biodiversity studies and conservation planning [2].

Tiger beetle populations on the Brookhaven National Laboratory (BNL) campus have been actively studied since Jonathan Mawdsley's initial survey of possible habitats on the campus in 2007 [3]. The abundance of sandy soil on the grounds makes the site particularly suitable for studying populations of tiger beetle species, as many of the tiger beetle species that have been found in New York State have been found to demonstrate

strong preference for sandy, sparsely vegetated habitat [4]. Previous research has located populations of tiger beetle species at several locations on the BNL campus and has indicated that the species found on the BNL campus prefer habitat containing sediment in the size range of medium to coarse sand [3,5].

Populations of Tiger Beetle species on the firebreaks that run along the eastern and northern border of the campus are of particular interest to the Department of Environmental Resource Management. Aside from containing the sandy, sparsely vegetated habitat favored by many species that have been found on the campus, the fire breaks are utilized by the lab as locations for the deposition of crushed concrete sediment [6]. The deposition of crushed concrete sediment alters the grain

size of the soil and changes soil compaction characteristics of the environment in such as way as to make it sub-optimal for those species of Tiger Beetle that prefer a more sandy soil.

While populations of Tiger Beetles have been documented on both the east and north firebreaks, no prior study has attempted to completely delineate the extent of those populations along either area. In constructing a comprehensive map of beetle locations at both fire breaks, it is hoped that the information gathered in this project will be useful in informing the continuing practice of depositing crushed concrete sediment so as to minimize the effect of such depositions on the tiger beetle populations of the firebreaks.

## Methodology:

- The number of adult beetles present along the firebreaks was determined using the standard visual index count method. [7]
  - Transect markers were established along the firebreak at intervals of every 0.1 miles.
  - Researchers walked slowly between markers, counting all adult Tiger Beetles that were observed.
- Photographic documentation of representative individuals was obtained.
- GPS coordinates for every transect marker were recorded.
- Weather conditions were monitored every half hour.

East Firebreak					
Transect (meters)	Survey 1 (7/27)		Survey 2 (8/9)		Average Count
	<i>C. punctulata</i>	<i>C. sexguttata</i>	<i>C. punctulata</i>	<i>C. sexguttata</i>	
0.0 - 0.1	1	0	0	0	0.5
0.1 - 0.2	1	0	0	0	0.5
0.2 - 0.3	1	0	0	0	0.5
0.3 - 0.4	1	0	0	0	0.5
0.4 - 0.5	1	0	0	0	0.5
0.5 - 0.6	1	0	0	0	0.5
0.6 - 0.7	1	0	0	0	0.5
0.7 - 0.8	1	0	0	0	0.5
0.8 - 0.9	1	0	0	0	0.5
0.9 - 1.0	1	0	0	0	0.5
1.0 - 1.1	1	0	0	0	0.5
1.1 - 1.2	1	0	0	0	0.5
1.2 - 1.3	1	0	0	0	0.5
1.3 - 1.4	1	0	0	0	0.5
1.4 - 1.5	1	0	0	0	0.5
1.5 - 1.6	1	0	0	0	0.5
1.6 - 1.7	1	0	0	0	0.5
1.7 - 1.8	1	0	0	0	0.5
1.8 - 1.9	1	0	0	0	0.5
1.9 - 2.0	1	0	0	0	0.5
2.0 - 2.1	1	0	0	0	0.5
2.1 - 2.2	1	0	0	0	0.5
2.2 - 2.3	1	0	0	0	0.5
2.3 - 2.4	1	0	0	0	0.5
2.4 - 2.5	1	0	0	0	0.5
2.5 - 2.6	1	0	0	0	0.5
2.6 - 2.7	1	0	0	0	0.5
2.7 - 2.8	1	0	0	0	0.5
2.8 - 2.9	1	0	0	0	0.5
2.9 - 3.0	1	0	0	0	0.5
3.0 - 3.1	1	0	0	0	0.5
3.1 - 3.2	1	0	0	0	0.5
3.2 - 3.3	1	0	0	0	0.5
3.3 - 3.4	1	0	0	0	0.5
3.4 - 3.5	1	0	0	0	0.5
3.5 - 3.6	1	0	0	0	0.5
3.6 - 3.7	1	0	0	0	0.5
3.7 - 3.8	1	0	0	0	0.5
3.8 - 3.9	1	0	0	0	0.5
3.9 - 4.0	1	0	0	0	0.5
4.0 - 4.1	1	0	0	0	0.5
4.1 - 4.2	1	0	0	0	0.5
4.2 - 4.3	1	0	0	0	0.5
4.3 - 4.4	1	0	0	0	0.5
4.4 - 4.5	1	0	0	0	0.5
4.5 - 4.6	1	0	0	0	0.5
4.6 - 4.7	1	0	0	0	0.5
4.7 - 4.8	1	0	0	0	0.5
4.8 - 4.9	1	0	0	0	0.5
4.9 - 5.0	1	0	0	0	0.5
5.0 - 5.1	1	0	0	0	0.5
5.1 - 5.2	1	0	0	0	0.5
5.2 - 5.3	1	0	0	0	0.5
5.3 - 5.4	1	0	0	0	0.5
5.4 - 5.5	1	0	0	0	0.5
5.5 - 5.6	1	0	0	0	0.5
5.6 - 5.7	1	0	0	0	0.5
5.7 - 5.8	1	0	0	0	0.5
5.8 - 5.9	1	0	0	0	0.5
5.9 - 6.0	1	0	0	0	0.5
6.0 - 6.1	1	0	0	0	0.5
6.1 - 6.2	1	0	0	0	0.5
6.2 - 6.3	1	0	0	0	0.5
6.3 - 6.4	1	0	0	0	0.5
6.4 - 6.5	1	0	0	0	0.5
6.5 - 6.6	1	0	0	0	0.5
6.6 - 6.7	1	0	0	0	0.5
6.7 - 6.8	1	0	0	0	0.5
6.8 - 6.9	1	0	0	0	0.5
6.9 - 7.0	1	0	0	0	0.5
7.0 - 7.1	1	0	0	0	0.5
7.1 - 7.2	1	0	0	0	0.5
7.2 - 7.3	1	0	0	0	0.5
7.3 - 7.4	1	0	0	0	0.5
7.4 - 7.5	1	0	0	0	0.5
7.5 - 7.6	1	0	0	0	0.5
7.6 - 7.7	1	0	0	0	0.5
7.7 - 7.8	1	0	0	0	0.5
7.8 - 7.9	1	0	0	0	0.5
7.9 - 8.0	1	0	0	0	0.5
8.0 - 8.1	1	0	0	0	0.5
8.1 - 8.2	1	0	0	0	0.5
8.2 - 8.3	1	0	0	0	0.5
8.3 - 8.4	1	0	0	0	0.5
8.4 - 8.5	1	0	0	0	0.5
8.5 - 8.6	1	0	0	0	0.5
8.6 - 8.7	1	0	0	0	0.5
8.7 - 8.8	1	0	0	0	0.5
8.8 - 8.9	1	0	0	0	0.5
8.9 - 9.0	1	0	0	0	0.5
9.0 - 9.1	1	0	0	0	0.5
9.1 - 9.2	1	0	0	0	0.5
9.2 - 9.3	1	0	0	0	0.5
9.3 - 9.4	1	0	0	0	0.5
9.4 - 9.5	1	0	0	0	0.5
9.5 - 9.6	1	0	0	0	0.5
9.6 - 9.7	1	0	0	0	0.5
9.7 - 9.8	1	0	0	0	0.5
9.8 - 9.9	1	0	0	0	0.5
9.9 - 10.0	1	0	0	0	0.5
10.0 - 10.1	1	0	0	0	0.5
10.1 - 10.2	1	0	0	0	0.5
10.2 - 10.3	1	0	0	0	0.5
10.3 - 10.4	1	0	0	0	0.5
10.4 - 10.5	1	0	0	0	0.5
10.5 - 10.6	1	0	0	0	0.5
10.6 - 10.7	1	0	0	0	0.5
10.7 - 10.8	1	0	0	0	0.5
10.8 - 10.9	1	0	0	0	0.5
10.9 - 11.0	1	0	0	0	0.5
11.0 - 11.1	1	0	0	0	0.5
11.1 - 11.2	1	0	0	0	0.5
11.2 - 11.3	1	0	0	0	0.5
11.3 - 11.4	1	0	0	0	0.5
11.4 - 11.5	1	0	0	0	0.5
11.5 - 11.6	1	0	0	0	0.5
11.6 - 11.7	1	0	0	0	0.5
11.7 - 11.8	1	0	0	0	0.5
11.8 - 11.9	1	0	0	0	0.5
11.9 - 12.0	1	0	0	0	0.5
12.0 - 12.1	1	0	0	0	0.5
12.1 - 12.2	1	0	0	0	0.5
12.2 - 12.3	1	0	0	0	0.5
12.3 - 12.4	1	0	0	0	0.5
12.4 - 12.5	1	0	0	0	0.5
12.5 - 12.6	1	0	0	0	0.5
12.6 - 12.7	1	0	0	0	0.5
12.7 - 12.8	1	0	0	0	0.5
12.8 - 12.9	1	0	0	0	0.5
12.9 - 13.0	1	0	0	0	0.5
13.0 - 13.1	1	0	0	0	0.5
13.1 - 13.2	1	0	0	0	0.5
13.2 - 13.3	1	0	0	0	0.5
13.3 - 13.4	1	0	0	0	0.5
13.4 - 13.5	1	0	0	0	0.5
13.5 - 13.6	1	0	0	0	0.5
13.6 - 13.7	1	0	0	0	0.5
13.7 - 13.8	1	0	0	0	0.5
13.8 - 13.9	1	0	0	0	0.5
13.9 - 14.0	1	0	0	0	0.5
14.0 - 14.1	1	0	0	0	0.5
14.1 - 14.2	1	0	0	0	0.5
14.2 - 14.3	1	0	0	0	0.5
14.3 - 14.4	1	0	0	0	0.5
14.4 - 14.5	1	0	0	0	0.5
14.5 - 14.6	1	0	0	0	0.5
14.6 - 14.7	1	0	0	0	0.5
14.7 - 14.8	1	0	0	0	0.5
14.8 - 14.9	1	0	0	0	0.5
14.9 - 15.0	1	0	0	0	0.5
15.0 - 15.1	1	0	0	0	0.5
15.1 - 15.2	1	0	0	0	0.5
15.2 - 15.3	1	0	0	0	0.5
15.3 - 15.4	1	0	0	0	0.5
15.4 - 15.5	1	0	0	0	0.5
15.5 - 15.6	1	0	0	0	0.5
15.6 - 15.7	1	0	0	0	0.5
15.7 - 15.8	1	0	0	0	0.5
15.8 - 15.9	1	0	0	0	0.5
15.9 - 16.0	1	0	0	0	0.5
16.0 - 16.1	1	0	0	0	0.5
16.1 - 16.2	1	0	0	0	0.5
16.2 - 16.3	1	0	0	0	0.5
16.3 - 16.4	1	0	0	0	0.5
16.4 - 16.5	1	0	0	0	0.5
16.5 - 16.6	1	0	0	0	0.5
16.6 - 16.7	1	0	0	0	0.5
16.7 - 16.8	1	0	0	0	0.5
16.8 - 16.9	1	0	0	0	0.5
16.9 - 17.0	1	0	0	0	0.5
17.0 - 17.1	1	0	0	0	0.5
17.1 - 17.2	1	0	0	0	0.5
17.2 - 17.3	1	0	0	0	0.5
17.3 - 17.4	1	0	0	0	0.5
17.4 - 17.5	1	0	0	0	0.5
17.5 - 17.6	1	0	0	0	0.5
17.6 - 17.7	1	0	0	0	0.5
17.7 - 17.8	1	0	0	0	0.5
17.8 - 17.9	1	0	0	0	0.5
17.9 - 18.0	1	0	0	0	0.5
18.0 - 18.1	1	0	0	0	0.5
18.1 - 18.2	1	0	0	0	0.5
18.2 - 18.3	1	0	0	0	0.5
18.3 - 18.4	1	0	0	0	0.5
18.4 - 18.5	1	0	0	0	0.5
18.5 - 18.6	1	0	0	0	0.5
18.6 - 18.7	1	0	0	0	0.5
18.7 - 18.8	1	0	0	0	0.5
18.8 - 18.9	1	0	0	0	0.5
18.9 - 19.0	1	0	0	0	0.5
19.0 - 19.1	1	0	0	0	0.5
19.1 - 19.2	1	0	0	0	0.5
19.2 - 19.3	1	0	0	0	0.5
19.3 - 19.4	1	0	0	0	0.5
19.4 - 19.5	1	0	0	0	0.5
19.5 - 19.6	1	0	0	0	0.5
19.6 - 19.7	1	0	0	0	0.5
19.7 - 19.8	1	0	0	0	0.5
19.8 - 19.9	1	0	0	0	0.5
19.9 - 20.0	1	0	0	0	0.5
20.0 - 20.1	1	0	0	0	0.5
20.1 - 20.2	1	0	0	0	0.5
20.2 - 20.3	1	0	0	0	0.5
20.3 - 20.4	1	0	0	0	0.5
20.4 - 20.5	1	0	0	0	0.5
20.5 - 20.6	1	0	0	0	0.5
20.6 - 20.7	1	0	0	0	0.5
20.7 - 20.8	1	0	0	0	0.5
20.8 - 20.9	1	0	0	0	0.5
20.9 - 21.0	1	0	0	0	0.5
21.0 - 21.1	1	0	0	0	0.5
21.1 - 21.2	1	0	0	0	0.5
21.2 - 21.3	1	0	0	0	0.5
21.3 - 21.4	1	0	0	0	0.5
21.4 - 21.5	1	0	0	0	0.5
21.5 - 21.6	1	0	0	0	0.5